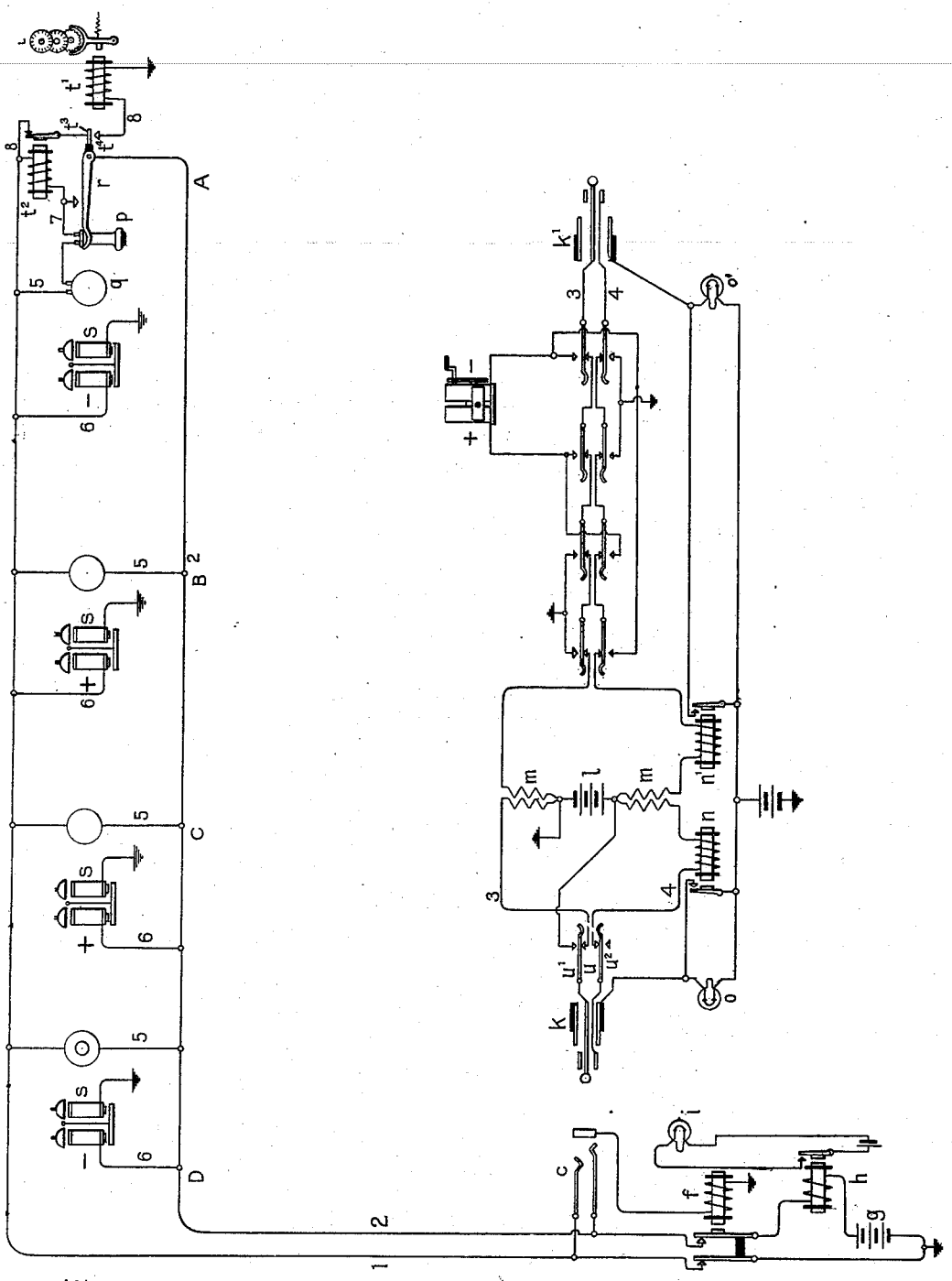
No. 648,533. Patented May 1, 1900.

C. E. SCRIBNER.

CONNECTION COUNTER FOR TELEPHONE LINES.

(Application filed Jan. 7, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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CONNECTION-COUNTER FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 648,533, dated May 1, 1900.

Application filed January 7, 1899. Serial No. 701,501. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Connection-Counters for Telephone-Lines, (Case No. 472,) of which the following is a full, clear, concise, and exact description.

This invention concerns the counting or registration at a subscriber's telephone-substation of conversations initiated at the station.

It consists in a counter, means associated with the circuits of the line for positively actuating the counter, and a controlling agency at the central office, the object of the improvement being to prevent accidental changes of circuit from effecting registration.

The improved counter comprises an actuating-magnet for operating the counting mechanism and a controlling-magnet for preventing the operation of the actuating-magnet, the operating and controlling magnets being associated with the line in circuits whereby the controlling-magnet is normally excited, and a switch at the central office for controlling the magnets independently to render the controlling-magnet inert and the actuating-magnet operative.

The invention is especially adapted for use on party-lines provided with selective signals and is illustrated in the drawing hereto attached in its application to such lines.

The invention is designed, primarily, for use with the circuits and apparatus commonly known as the "common battery automatic signal system," such as is described at length in Patent No. 596,630, of January 4, 1898, to myself, and in association with party-lines with selective signals like those patented in Patent No. 555,725, of March 3, 1896, to A. S. Hibbard.

In the drawing a single telephone-line is represented, terminating in calling and connecting appliances in the switchboard at a central office and provided with four stations equipped with selective signal-bells. The complete mechanism, including a connection-counter, is illustrated at only one of the stations, that at the other stations being merely indicated.

The telephone-line, consisting of wires 1 and 2, leads from the stations A, B, C, and D to the switch-contacts of a spring-jack *c* in the switchboard, from which point the conductors are prolonged through the switch-contacts of a cut-off relay *f* to earth and to the free pole of a grounded battery *g*, respectively, the magnet of a relay *h*, controlling a line-signal *i* in the switchboard, being interposed in the conductor 2 of the circuit. The actuating-magnet of the cut-off relay *f* is included in a portion of a local-battery circuit which terminates in a normally-open contact-piece in the spring-jack *c*. Pairs of plugs *k* and *k'* are furnished in the switchboard for uniting lines. These plugs form the terminals of a plug-circuit 3 4, which is bridged by a conductor, including a source of current *l*, the windings of a repeating-coil *m* being interposed in the conductors 3 and 4 of the circuit in a way to maintain the inductive continuity of the plug-circuit, while maintaining the conductive independence of lines united through the plug-circuit with respect to the source of current. The pole of the battery *l*, which is connected with the conductor 3 of the plug-circuit, is grounded. Relays *n* and *n'* are placed in the path of current in conductor 4, one at each side of the interposed repeating-coil windings, which control supervisory signals *o* and *o'*, associated with the plugs *k* and *k'*, respectively, in circuits which coöperate with the circuits, including the magnets of the cut-off relays, of lines with which the plugs are connected to excite the relays and the supervisory signals. A group of calling-keys is provided to direct current for selective signaling through the calling-plug *k'* in accordance with Patent No. 555,725 before mentioned, one of the keys being adapted to apply positive current to one of the line conductors, another being arranged to apply negative current to the same line conductor, and the remaining two being adapted to perform similar functions with respect to the other line conductor. A listening-key is also furnished for the operator to connect her telephone with the plug-circuit.

At the subscriber's station, as A, a receiving-telephone p and a transmitting-telephone q are included in a normally-open bridge 5 of the line, which is controlled by the usual telephone-switch r. At each station a call-bell s, responsive to pulsating-current, is included in a ground branch 6 from one of the line conductors, two bells responsive to current of opposite polarity being connected in the two ground branches from each of the line conductors.

The connection counting appliance, which is shown at station A, consists of a counting-train t and actuating-magnet t' therefor, adapted to move the counting-train to register one unit in each pulsation of current through the magnet and a relay t^2. The relay t^2 is connected in a shunt-circuit 7 about the telephone and transmitter. It should be of high impedance to avoid shunting of telephonic current through it. The actuating-magnet t' is connected in a ground branch 8 from the line conductor 1 of the line, the switch-contacts of the relay t^2, which thus constitutes the controlling-magnet hereinbefore referred to, being interposed in the circuit. The continuity of the path through this magnet t' is also controlled by switch-contacts t^3 t^4 of the telephone-switch, the circuit being open when the telephone is on its hook. The controlling switch or mechanism at the central office for controlling and actuating this counting appliance consists in a key u of two levers, each with a normal and an alternate contact-point. The levers u' and u^2, with their normal resting-contacts, are interposed in the conductors 3 and 4 of the plug-circuit leading to the answering-plug, respectively. The alternate contact of lever u' is connected with the free pole of battery l. The effect of this key when depressed is thus to apply a source of current to the line-wire 1, while disconnecting all sources of current from the normally-excited line-wire 2.

In the normal or idle condition of the line the removal of the telephone from its switch for use permits current to flow from the battery g through the bridge, including the telephone, to the conductor 1 of the line; but the current in this bridge excites the controlling-magnet t^2 and deprives the magnet t' of current, thus preventing it from operating the counting mechanism. When in response to a call thus initiated the operator inserts the answering-plug k in the terminal spring-jack of the line, the source of current g is disconnected from line-wire 2; but the source of current l is applied instead, so that the excitement of magnet t^2 is maintained. No accidental condition which can arise in ordinary practice can result in the simultaneous application of current to line-wire 1 and the breaking of all circuits of line-wire 2 of sufficiently-low resistance to permit the operation of magnet t^2. At any suitable stage in the act of making connection the operator may depress the key u, however, thereby applying current to the line-wire 1 and severing the normal ground-return of wire 2, by which act the magnet t^2 is deprived of current and caused to close the circuit of magnet t', while the latter is excited by a current in the line-wire 1. The user of the telephone cannot prevent this act, inasmuch as the replacement of his telephone on its switch would be indicated to the operator by the supervisory signal o.

A feature of novelty in this invention consists in the use of the magnet t^2 in a bridge of the metallic line-circuit controlling the current through magnet t', which is designed to operate the registering or other mechanism. During the existence of current in the metallic circuit, which is the normal condition of the line, the magnet t^2 is excited and maintains the inert condition of the magnet t'; but when it is designed to operate the counting mechanism the magnet t^2 is deprived of current by breaking its normal return-circuit at the central office, while current is applied to the line for operating the magnet t'. This feature may of course be made use of in connection with appliances at the substation other than counting mechanism, which must be protected from the normal current circulating in the line, but which are designed for operation by currents applied to one side of the line only.

The invention is defined in the following claims:

1. The combination with a metallic-circuit telephone-line and a battery applied to one line conductor thereof and a ground connection with the other, of mechanism and an actuating-magnet therefor at the substation, in a ground branch from the normally-grounded side of the line, a bridge of the metallic circuit including the telephone, a controlling-magnet in the normal path of current in the line-circuit controlling the current through said magnet in the ground branch, and a key at the central office adapted to break the battery connection with one limb of the line and apply a grounded battery to the other limb of the line, as described.

2. The combination with a telephone-line and normal battery connections therewith, of a connection-counter at the substation and an actuating-magnet therefor, a controlling-magnet controlling the current through said actuating-magnet, said controlling-magnet being normally excited while the telephone is off the hook, and means at the central office for rendering the controlling-magnet inert and applying current to the actuating-magnet, as described.

3. The combination with a metallic-circuit telephone-line, a grounded battery applied to one line conductor thereof, and a ground connection to the other line conductor at the central office, and a bridge of the line at the substation including telephone appliances, of counting mechanism and an actuating-magnet therefor in a ground branch of the line,

a controlling-magnet in a bridge of the line adapted to break the circuit of the counter-actuating magnet when excited, and keys at the central office adapted to break the normal battery connection and to apply a source of current to the other line conductor, as described.

In witness whereof I hereunto subscribe my name this 10th day of December, A. D. 1898.

CHARLES E. SCRIBNER.

Witnesses:
ELLA EDLER,
ELIZABETH SIBLEY.